

## MANUAL CONTROL FOR A MOTOR VEHICLE

5 The present invention relates to motor vehicles and more specifically to the manual controls used in motor vehicles to allow a passenger to operate equipment such as window lifters or locks.

In the vehicle marketed by Audi® as the A4, there are, on the driver's front door, a central locking passenger control, a passenger control for operating the window lifter of the passenger door and passenger controls for actuating the window lifters of the rear doors. The rear doors simply have a passenger control for operating  
10 the window lifter. The passenger controls provided in this vehicle are just one example demonstrating the diversity of controls desired by motor vehicle manufacturers: a driver's door may easily have up to six separate controls.

DE-U-298 10 421 discloses the use, for the passenger control for a window lifter, of a plurality of sensors arranged in a line. Examples of sensors proposed in  
15 this document are pressure sensors, known in the field of computing as "touchpads" or alternatively photosensitive sensors. The position of the window is controlled according to which sensor is influenced.

DE-A-43 13 030 discloses passenger controls formed of a switch mounted on a printed circuit. The switch is influenced through an elastic "skin" made of  
20 polyurethane; in another example, a rigid button is inserted into the elastic skin.

US-A-5 805 402 discloses an integrated assembly, with various actuating controls. Actuating buttons are mounted in openings; underneath these buttons there is a flexible printed circuit exhibiting tracks. Pressure on the buttons causes contact between the tracks of the printed circuit.

25 WO-A-01/15186 discloses a passenger switch for a motor vehicle. A breaker is mounted on a printed circuit and is surmounted by a mechanical element. The passenger actuates the switch by acting on the mechanical element, which influences the breaker. In another example, the printed circuit simply has conducting pads which are connected by metalized regions under the mechanical elements.

30 Yet another example of a control is disclosed in United States patent 6 354 653; that document shows a control with switches influenced through the door interior lining.

There is still a need for a solution that makes it possible to provide diverse passenger controls able to be tailored to the requirements of manufacturers, while at  
35 the same time reducing the diversity.

In one embodiment, the invention therefore discloses a manual control, comprising:

- a sensor in the form of a physical matrix and exhibiting a sensitive surface;

- at least one key defining a point to be pressed and being designed to act upon the sensitive surface under the action of being manually pressed.

In one embodiment, the key is fixed to the sensor.

Provision may also be made for the control to exhibit a support in which the  
5 keys are formed and against which the sensor is fixed.

Advantageously, the sensor is designed to provide a signal that is a function of the position of a point of influence of the sensitive surface. The signal may be supplied on one or two wires.

As a preference, the keys are compressible.

10 The invention also discloses a window lifter exhibiting a geared motor controlled by a control as described hereinabove.

The advantage of this embodiment is that it allows the passenger controls to be configured in a simple and purely software manner, to suit the requirements.

Other features and advantages of the invention will become apparent on  
15 reading the detailed description which follows of some embodiments of the invention, given by way of example only and with reference to the single figure which shows a schematic perspective depiction of a control according to one embodiment of the invention.

The figure is a schematic perspective depiction of a control according to one  
20 embodiment of the invention. This control exhibits a sensor in the form of a physical matrix or sensitive base 2 in the form of a physical matrix; the sensor or base typically has four connecting wires 4 or four terminals for connecting these wires: two of the wires are used for power and the other two wires are used by the base or sensor to emit the signals, as explained hereinbelow. The base in the example of the  
25 figure has the shape of a rectangle.

The base is sensitive in that it is able to supply an electrical signal according to the pressure or contact on at least one of its surfaces - in the example of the figure, the upper surface 6. It therefore constitutes a pressure or contact sensor.

The base is in the form of a physical matrix in that it is capable of supplying  
30 signals according to the position in which it is influenced on the sensitive surface, without in any way having as many connecting wires as there are detectable positions. In the example of the figure, the base supplies an indication of the position of the point or points of influence in the x and y directions depicted in the figure. For greater simplicity, the corresponding signals are emitted by the sensor on two wires -  
35 one corresponding to the position along the x-axis and the other to the position along the y-axis. The two positions could also be coded on just one wire.

These directions are defined in the example of the figure by the edges of the base, which is rectangular; it will, however, be understood that the direction or

directions for identifying the positions of influence are independent of the shape of the base.

Such sensors or sensitive bases are marketed by Densitron under the reference DTS407-0041. Use may be made of resistive or capacitive tile technology, both  
 5 being sensitive to temperature. It is also possible to use contact technology with a polyester film and metal contacts. Pressure on the physical matrix gives rise to a local contact. This then yields a physical matrix that is not sensitive to temperature.

The control in the figure also has actuating keys or buttons 8, 10, 12 and 14; in the example of the figure, there are four of these points, allowing the following  
 10 functions of a window lifter to be fulfilled:

- automatic raising, pressure on the key triggering the raising of the window as far as the closed position;
- automatic lowering, pressure on the key triggering the lowering of the window as far as the open position;
- 15 - manual raising, pressure on the key triggering the raising of the window, the window continuing to rise as long as the pressure on the key is maintained;
- manual lowering, pressure on the key triggering the lowering of the window, the window continuing to be lowered as long as the pressure on the key is maintained.

20 Other keys such as the locking keys mentioned in the example of the Audi A4 could also be provided on the base.

The keys define, for the user, where to press for a given control; in fact, as shown by the figure, the base is not differentiated according to the keys to be supplied in the control. In other words, only the keys define the configuration of the  
 25 control. This has the advantage that identical bases can be used for different controls. The diversity of the parts needed for the various functions is reduced. It is also possible simply to tailor the control to the customer requirements by changing the number of keys; whatever the number of keys in the control, it is possible to use the same base. Changing the number of keys or the position of the keys is done simply  
 30 by programming, on the basis of signals supplied by the sensitive base on the connection wires. The number of connections is also limited: the control in the figure uses just two wires - apart from the power supply wires, rather than two wires per key as in the prior art. The control also is of slim thickness, making it easier to integrate.

35 Conversely, the solutions of the prior art dictate, for different control configurations (different sets of keys), the development of a different printed circuit. This multiplies development times and the possible errors on mounting. The costs are increased through the need to stock-control various parts.

Unlike the set of sensors described in DE-U-298 10 421, the base in the form of a physical matrix is not influenced directly by the user: on the contrary, the control has keys which, for the user, define where to press. This has the advantage of protecting the base and allows the base to be used with equal ease for different controls. Furthermore, the solution in the figure makes it possible for the user to keep the keys or buttons of a "mechanical" nature to which he is accustomed.

The keys or buttons may be fixed to the base; this solution eases mounting, because all that is required is for the assembly comprising the base and the keys fixed to it to be arranged on the support (not depicted in the figure). This support may exhibit access holes providing access to the keys. It is also possible to use a flexible support, through which the user presses on the keys. This solution has the advantage that the position of the keys is defined at the time of assembly of the control in the factory and there is no risk of it varying upon mounting onto the vehicle.

The keys may also be formed in the support of the base. In this case, all that is required for assembly of the control is for the base to be fixed to the support, near the keys. This solution simplifies the manufacture of the control and offers greater freedom in design of the keys: they need merely to be able to move in order to influence the sensitive surface of the base. This solution also simplifies the sealing of the control; all that is required is the provision of a film between the keys and the sensor in order to protect the sensor.

It will be understood that the solution described with reference to the figure also allows the customer (the motor vehicle manufacturer) to be offered solutions that vary in the nature and the position of the keys. In particular, use may be made of foam keys, conventional buttons with a foam underside, a flexible plastic film with a boss, a combination of plastic films. Any kind of signaling may readily be provided, for example using pictograms printed onto the plastic film. The fact of providing compressible keys protects the base against excessive pressure on the part of the user.

The way in which the control in the figure operates is as follows: the user presses on one of the keys. Under the effect of the pressing of the button, the sensitive base 2 emits a signal on the connecting wires. The signal is a function of the key or keys on which the user is pressing. The signal is transmitted to a processing circuit (not depicted in the figure). Depending on the nature of the signal received, the processing signal emits the commands. In the example of a motor vehicle door and of a window lifter control, the processing signal may be a local circuit dedicated to controlling the window lifter. If the control is a more complex control, for example with functions of locking or unlocking a lock or functions of raising or

lowering the windows of other doors, then the control circuit may be incorporated into the door multiplexer.

Of course, the present invention is not restricted to the embodiments described by way of example; thus, we have mentioned the example of door controls. The  
5 controls described above can be used more generally for applications other than the doors of motor vehicles; for example the controls could be used for sunroofs.

CLAIMS

1. A manual control, comprising:
  - a sensor (2) comprising a base in the form of a physical matrix and exhibiting  
5 a sensitive surface (6);
  - at least one key (8, 10, 12, 14) defining a configuration of the control, said  
key defining a point to be pressed and being designed to act upon the sensitive  
surface under the action of being manually pressed.
- 10 2. The control of claim 1, wherein the key (8, 10, 12, 14) is fixed to the  
sensor.
3. The control of claim 1, which exhibits a support in which the keys (8,  
10, 12, 14) are formed and against which the sensor is fixed.
- 15 4. The control of claim 1, 2 or 3, wherein the sensor is designed to  
provide a signal that is a function of the position of a point of influence of the  
sensitive surface.
- 20 5. The control of claim 4, in which the signal is supplied on one or two  
wires.
6. The control of one of claims 1 to 5, wherein the keys are  
compressible.
- 25 7. A window lifter exhibiting a geared motor controlled by a control as  
claimed in one of the preceding claims.

### ABSTRACT

5 A manual control comprises a sensor (2), in the form of a physical matrix, with a sensitive surface (6) and keys (8, 10, 12, 14) defining a point for pressing and influencing the sensitive surface under the action of being pressed by hand. The keys are fixed to the sensor or alternatively are connected to a support against which the sensor is fixed.

10 The control can easily be reconfigured for different sets of keys, without any need to modify the sensor.

Single figure

